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The Association between Smartphone usage and General Health in Adult Cancer Patients: A Study of the Turkish Population during the COVID-19 Pandemic

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Authors' contributions

This work was carried out in collaboration among all authors. Author BBO designed the study, performed the statistical analysis, author SC wrote the protocol and authors NK and UC wrote the first draft of the manuscript. Author LE managed the analyses of the study. Author ARN managed the literature searches and revised as native speaker. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The aim of this study is to determine the effect of smartphone screen time on general health status of adult patients with cancer compared to healthy participants in a Turkish population amidst the COVID-19 pandemic.
Materials and Methods: 146 participants took part in this study, 81 of them were cancer patients. The mean screen time throughout their last week was obtained from the smartphones of all participants. The health status of participants was analyzed via the General Health Survey (GHS) which was a self-reported questionnaire including 12 items rated on a Likert scale. The relationship

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between screen time and GHS score and related factors for participants was compared.
Results: The median screen time and GHS of participants were 180 minutes (10-945) and 13.5 (4-28), respectively. After screen time was categorized in respect to the mean of 180 minutes, A younger age (p=0.007), higher educational status (p=0.03), and early-stage disease (p=0.03) were each associated with increased screen time. Cancer stage had a correlation with GHS (add p value and correlation coefficient). While educational level was positively related with screen time (r=0.216, p=0.009), age (r=-0.471, p<0.001) and cancer stage (r=-0.332, p=0.03) were negatively correlated. Screen time was not found to be associated with GHS scores in both cancer patients and healthy participants.
Conclusion: Although smartphone usage has been increasing secondary to the dependence on social networks and increasing in-person restrictions, it did not affect the mental wellbeing among patients with cancer nor healthy participants.

Keywords: Screen time; general health scale; cancer patients; adult; Turkish population.

1. INTRODUCTION

Since the rise of the 21st century, the surge of digital technology and subsequent screen-based activities have now been implicated in many of the population's daily activities. Whether used for the purpose of leisure, communication, work, or generally being up to date with the modern world, there is no doubt that technology is more immersed in our lives than ever before. While digital tools like smartphones have undeniably revolutionized our lifestyles into a more simplified version, they are not without disadvantages. For instance, increased screen-based behaviors may lead to increased personal isolation from the social environment and have been linked to negative psychologic and cardiovascular downstream effects [1,2].

While guidelines recommend an average screen time of 2 hours per day for the pediatric population [3], the vast majority of children exceed a median of seven to eight hour per day [4]. This is remarkable since increased screen time durations were reported to be associated with reduced psychosocial wellness and overall health quality, especially in obese adolescents [4,5]. While higher internet usage has already been associated with depression [6], these effects may have a worse effect on the emotional health of cancer patients, who often struggle with anxiety, depression, and other psychiatric comorbidities secondary to the nature of their illnesses as well as their abilities to cope with them. With the increasing incidence and prevalence of anxiety and depression in modern society, a quantitative assessment tool can help assess for environmental factors and their effects on mental health. As such, the General Health Survey (GHS) is a tool used to identify individuals at risk for psychological distress [7].

During the COVID 19 pandemic, increased social restrictions undoubtedly led to an increased screen time in most of the population. The usage of smartphones, in particular, has skyrocketed given its portability, ease of access, and almost universal presence within the population.

The purpose of this article is to identify the association of screen time with the risk of psychological distress in cancer patients, represented by their GHS scores. A cross-sectional analysis was performed during the COVID-19 pandemic meant to quantitatively evaluate the usage of smartphones in cancer patients and healthy participants, as well as assess their GHS scores. To the best of our knowledge our study is the first to examine screen time duration and general health status and related factors among adult patients with cancer and healthy participants during the COVID-19 pandemic.

2. MATERIAL AND METHODS

Cross-sectional survey was conducted at Oncology Department of Bahcesehir University Medical Faculty Goztepe Medical Park Hospital in 2021. A total of 146 participants were enrolled. Of which, 81 (55.5%) were cancer patients, defined as patients being actively treated or being followed up in the oncology outpatient clinic for malignancy, and 65 (44.5%) participants were healthy controls, mostly being accompanying relatives of patients visiting the oncology outpatient clinic as well as other departments of the hospital. Written informed consent was obtained from all participants, and

screen time duration was assessed by recording the mean time used on a smartphone during the previous week in all participants. The screen time was categorized as >180 or ≤180 hour, which represented the median time for both groups. Participants who did not sign the consent or do not have smartphones were excluded from the study. The ethical approval was obtained from Bahcesehir University Local Ethical Committee (2020-11/04). Patients' age, gender, presence of comorbid chronic diseases, tumor stage, and socioeconomic status (education, marital status, and occupation) were also assessed. Afterwards, participants completed a self-administered General Health Survey 12 (GHS) questionnaire, developed by David Goldberg and adapted to Turkish by C. Kilic [8,9] to examine clinically relevant symptoms of psychological distress. The GHS questionnaire included 12 queries whose response options were based on a four-point Likert scale ranging from 'not at all' to 'much more than usual'. The scores ranged from 0-36. Increased scores were associated with increased incidence of psychiatric issues such as anxiety or depression. The GHS scores were categorized as >13 and ≤13 according to mean value.

2.1 Statistical Analysis

Statistical analyses were performed using SPSS 17.0 (SPSS Inc., Chicago, IL, USA). The mean values of both screen time and GHS were compared in patients with cancer and healthy participants by using independent sample T-test. Chi-square test was used to analyze the relation between screen time and GHS scores with sociodemographic characteristics. Logistic regression analysis was conducted to determine independent factors associated with screen time, while other related factors were compared via the Pearson correlation test. All p-values were two-sided, and a p-value less than or equal to 0.05 was considered statistically significant.

3. RESULTS

Median age, screen time and GHS score of participants were 52 years-old (18-85), 180 minutes (10-945) and 13.5 (4-28) for all groups, respectively. Females encompassed nearly 66% of the participants. Half of all participants graduated from university, and 66% of the participants were married and had an occupation. A total of 45 participants (30.8%) had at least one comorbid chronic disease. Baseline characteristics of all groups are summarized in Table 1. Although the mean screen time was increased in patients with cancer compared to their healthy relatives (mean: 204 hours vs 249 hours), it was not statistically significant (p=0.1). Additionally, the mean GHS score was not different between patients and healthy participants in both groups (p=0.5). Table 2 shows the comparison of the mean value of GHS and screening time.

Table 1. Group baseline characteristics

	number	%
Gender		
Female	97	66.4
Male	49	33.6
Educational Status		
Primary School	31	21.9
High School	41	28.1
University	73	50
Marital Status		
Other	53	36.3
Married	93	63.7
Occupation		
Employed	94	64.4
Unemployed	52	35.6
Chronic Disease(S)		
Absent	101	69.2
Present	45	30.8
Cancer Patients	81	55.5
Healthy Relatives	65	44.5

Table 2. Comparison of mean value of GHS and screening time

	mean	SD	p-value
GHS	13.3	5.6	0.5
Patients	13.9	5.2	
Controls			
Screen time			
Patients	204.09	17.04	0.1
Controls	249.81	23.03	

GHS:General Health Status
SD: Standard deviation

Age, educational status, and cancer stage were each independently associated with screen time in both groups. A younger age (p=0.007), higher educational status (p=0.03), and early-stage disease (p=0.03) were each associated with increased screen time. When patients and healthy participants were compared in respect to median screen time via the chi-square test, age (p=0.008), marital status (p=0.04) and stage of disease (p=0.003) were significantly associated

with screen time among patients with cancer, while only marital status was associated with screen time among the healthy group (p=0.01). Married and healthy participants had diminished screen time compared to the single counterparts. Table 3 provides an overview of the relation between screen time and socio-demographical features of both patients with cancer and the healthy counterparts.

The median GHS score was only associated with cancer stage (p=0.03). Early stage was related with a worse GHS score. The median GHS for patients with cancer was 13 (4-28) and 14.9 (4-27) for the healthy controls. While age and education level were independently related with screen time, a relation was not established with GHS, as evidenced by logistic regression analysis. Educational status was found to be positively correlated with screen time (r=0.216, p=0.009), while age (r=-0.471, p<0.001) and cancer stage (r=-0.332, p=0.03) were found to be negatively correlated by using Pearson correlation analysis. The results of the Pearson' correlation analysis is provided in Table 4.

Table 3. Relation between screen time and sociodemographical factors

	Screen time		
	≤180 minutes	**>180 minutes**	**p-value**
Age (years)			
patients			
<20	0	0	
20-40	4(8.8)	5(14)	
40-60	13(28.8)	21(60)	0.008
>60	28(62.2)	9(26)	0.2
controls			
<20	1(2.4)	3 (9)	
20-40	8(19)	14 (43)	
40-60	19(45.3)	13 (39)	
>60	14(33.3)	3(9)	
Gender		27(75)	
patients	31(68.9)	9(25)	
female	14 (31.1)		0.3
male			0.5
controls			
female	19 (59.3)	20(60.6)	
male	13(40.7)	13(39.4)	
Educational status			
patients			
primary school	16 (35.5)	8(22.3)	
high school	14 (31.2)	7(19.4)	0.08
university	15 (33.3)	21(58.3)	0.2
c**ontrols**			
primary school	6 (18.8)	2(6)	
high school	10 (31.2)	10 (30.4)	
university	16(50)	21(63.6)	
Marital status patients			
other	23(51.1)	10(27.8)	
married	22(48.9)	26(72.2)	
controls			0.04
other	5(15.6)	15(46.8)	0.01
married	27(84.4)	18(56.2)	
Occupation			
patients	34(75.5)	25(69.5)	

	Screen time		
	≤180 minutes	**>180 minutes**	**p-value**
employee	11(24.5)	11(30.5)	
unemployed			
controls			
employee	16(50)	19(57.6)	0.6
unemployed	16 (50)	14(42.4)	0.6
Chronic disease(s) patients			
absent	28(62.2)	22(61.1)	0.5
present	17(37.8)	14(38.9)	0.5
controls			
absent	25(78.1)	26(78.8)	
present	7(21.9)	7(21.2)	
Cancer patients	45(58.4)	36(52.1)	0.5
Healthy relatives	32(41.6)	33(47.9)	
Cancer stage			
I	3(7)	7(19.4)	0.03
II	4(9.3)	13(36.1)	
III	13(30.2)	4(11.2)	
IV	23(53.5)	12(33.3)	
GHS			
patients			
<13	26(57.8)	16(44.4)	0.2
>13	19(42.2)	20(55.6)	0.4
controls			
<13	17(53.1)	14(42.4)	
>13	15(46.9)	19(57.6)	

GHS:General Health Status

Table 4. Pearson' correlation analysis between screen time and various factors

	Screening time
Educational status	p=0.009, r=0.216
Age	p<0.001, r= - 0.471
Cancer stage	p=0.03, r=- 0.332
Gender	p=0.687, r=- 0.034
Marital status	p=0.987, r=0.001
Employment	p=0.884, r=0.012
Cancer patients/control	p=0.450, r=0.63
GHS score	p=0.325, r=0.082

GHS: general health score

4. DISCUSSION

Screen time, encompassing the usage of computers, mobile phones, digital tablets, and numerous other gadgets is a time-consuming activity in contemporary life. Screen-based digital media has potential benefits on health, social and cognitive function but can ultimately harm when overstated [10]. There are numerous considerable studies demonstrating harmful effects associated with screen time and health quality, sleep disturbance, physical inactivity, and obesity, particularly in adolescents [4,11–13]. In addition, a positive correlation was shown between with screen time and anxiety and depressive symptoms [10]. All these studies have demonstrated a potential decline in health quality with excessive screen-time usage. Not being limited to only the pediatric population, health quality is an independent predictor of morbidity and mortality in adults as well [14]. While measures such as health quality and quality of life are difficult to quantitatively assess, health surveys, such as the GHS, can help estimate the impact of certain environmental factors on mental health of different populations and varying age ranges.

While the COVID 19 pandemic has been associated with major implications in mental health [15], our study's mean GHS was 13, a number unexpectedly lower than the reported mean in the Turkish population before the pandemic [7]. This could perhaps be explained by the intrinsic nature of our sample size, which is relatively small, does not include pediatric

participants, and is acquired from a selective environment, the hospital. Previous reports in Turkey document that employment and higher education levels were associated with a lower GHS score [7], while female gender, advanced age, and unemployment were associated with worse psychological wellbeing. However, our study shows no association between gender and screen time or GHS. While Goldfield et al. [4] recorded screen time as time spent on watching television, using the computer, or playing video games, we determined screen time by recording the mean time of smartphone usage per week, mainly to ensure an easier, yet likely underestimated, approximation of screen time in adults. In addition, in contrast to the threshold of 2 hours per day assigned by the American Academy of Pediatrics (AAP) [16], we used a threshold of 180 minutes, which was the median screen time spent per week in our sample size. This threshold was considered a better fit for the adult population, despite not accounting for the non-smartphone screen sources. Compared to adolescents which had a positive correlation between screen time and age [17], our study sample reported a negative correlation between screen time and advanced age. This can be explained by the fact that young adults are more likely to be immersed in today's modern technology which relies heavily on smartphone screen usage. In addition, our study reports a negative correlation between screen time and cancer stage, a finding likely justified by the mental and physical toll advanced cancer can have on an individual, affecting their daily lives and digital communication with their surroundings.

While the association of excessive screen time and increasing psychological stress has already been demonstrated in abundance, our study was unable to demonstrate a significant relationship between screen time and GHS scores in cancer patients and healthy controls during the COVID-19 pandemic. The exact reason is yet to be elucidated but could be related to the inevitable increase in reliance on technology for entertainment, communication, and functioning during a pandemic restricting social activities. Furthermore, the anxiety and fear brought upon by the COVID-19 pandemic may have led to a decline in the ability and/or desire to perform regular outdoor activities, something that can be potentially offset, or ameliorated by, the smartphones and screens that can allow people to disassociate at will to more "entertaining" places. This can be particularly useful for cancer patients, which can often benefit from a temporary artificial change in reality.

5. CONCLUSION

To our knowledge, there is the first study evaluating screen time of adult patients with cancer and its correlation with their general health status. Major limitation of our study is defining screen time as only for smartphone usage and not accounting for the usage of other devices and gadgets. Further research is needed to illuminate the degree to which excessive screen time would remain insignificant to mental health and wellbeing in cancer patients.

CONSENT

Written informed consent was obtained from all participants, and screen time duration was assessed by recording the mean time used on a smartphone during the previous week in all participants.

ETHICAL APPROVAL

Bahcesehir University Local Ethical Committee (2020-11/04) written ethical approval has been collected and preserved by the author(s).

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There are no financial or commercial interests to declare regarding the authors of the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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